SERVICE BULLETIN

Original Issue Date: **5/96**
Model: **4/5CKM/CKMR, 4CFKM/CFKMR, 7CCKM/CCKMR, 7CCFKM/CCFKMR, and 6.5RMY**
Market: **RV, Mobile, and Small Standby**
Subject: **Kohler Electronic Governor (D-278670) Troubleshooting**

Kohler Generator Division, in an attempt to reduce returns of functional electronic governors, created this bulletin to better inform customers. Consult the Service Manual for adjustment procedures not found in this bulletin.

Model	Service Manual Publication Number
4/5CKM/CKMR 4CFKM/CFKMR	TP-5394
7CCKM/CCKMR 7CCFKM/CCFKMR	TP-5570
6.5RMY	TP-5632

Figure 1. Service Manual Selection

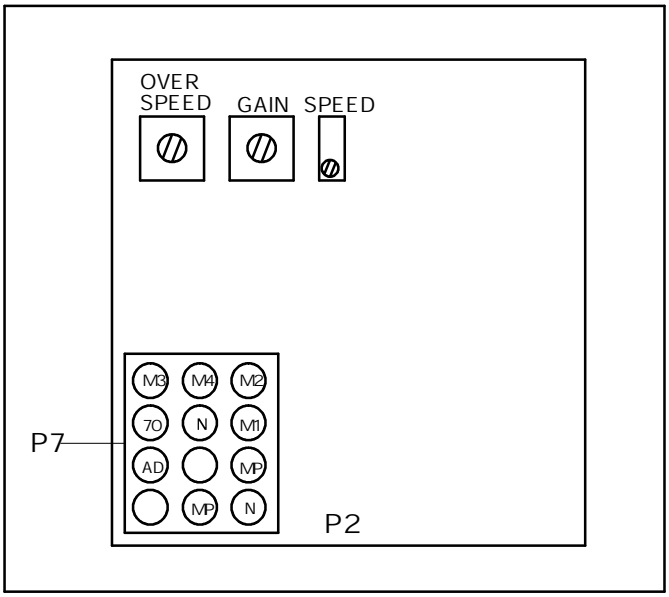
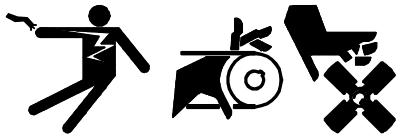


Figure 2 Kohler Electronic Governor Control

WARNING



Accidental starting.
Can cause severe injury or death.

Disconnect battery cables before working on generator set (disconnect negative lead first and reconnect it last).

Disabling generator set. Accidental starting can cause severe injury or death. Disconnect battery cables (remove negative lead first and reconnect it last) to disable generator set before working on the generator set or connected equipment. The generator set can be started by the remote start/stop switch unless this precaution is followed.

Routing	Service Manager	Sales Manager	Parts Manager	Technician No. 1	Technician No. 2	Technician No. 3	Return This to
Initial Here							

⚠ WARNING

Hazardous voltage.

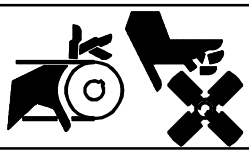
Moving rotor.

Can cause severe injury or death.

Operate generator set only with all guards and electrical enclosures in place.

Grounding generator set. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open main circuit breakers of all power sources before servicing equipment. Configure the installation to electrically ground the generator set and electrical circuits when in use. Never contact electrical leads or appliances when standing in water or on wet ground, as the chance of electrocution is increased under such conditions.

⚠ WARNING



Rotating parts.
Can cause severe injury or death.

Do not operate generator set without all guards, screens, and covers in place.

Exposed moving parts can cause severe injury or death. Keep hands, feet, hair, and clothing away from belts and pulleys when unit is running. Replace guards, covers, and screens before operating generator set.

The governor system consists of an electronic isochronous governor, an electro-mechanical stepper motor, and a magnetic pickup. Electrical pulses are supplied by the magnetic pickup to the isochronous governor (control unit) each time one of the ring gear teeth passes the pickup. The control unit compares the frequency of these pulses to a preset reference and provides a signal to the stepper motor which controls the carburetor throttle position and the engine speed. This is a closed-loop system and typically provides steady-state speed regulation of ±0.25%.

The factory sets the electronic governor and the governor usually requires no further adjustment. If the unit operates erratically, check the following items *before* readjustment.

- Check the carburetor for dirt, grime, or misadjustment. Also, check the idle-adjustment screw. The screw should not prevent the throttle plate from completely closing. Also, check the throttle linkage for any binding, dirt, damage, etc.
- Check electrical connections—check the stepper motor, controller box, and governor connector (inside the controller) for clean and tight connections.
- Check electrical ground connections—a good DC ground must be provided to the controller assembly and governor circuit.
- Check for a good positive 12-volt DC supply. Also check if the positive voltage supply is unstable or below 8-volts DC making the control unit function erratically.
- Check magnetic pickup connections. Poor connections may cause the signal to be erratic. As long as this erratic signal is being sent, the unit will not shut down due to loss of pickup.
- Check for dirt buildup on magnetic pickup—metal filings or caked-on dirt/grease may decrease the output signal of the magnetic pickup.
- Check for a loose coupling screw.
- Check for stepper motor/throttle shaft coupling wear—if the roll pin wore the slot of the stepper motor coupling, loosen coupling screw and move coupling so that roll pin is positioned at a point in stepper motor coupling without wear. Tighten coupling screw.

Magnetic Pickup
(See Figure 3 or Figure 4)

The magnetic pickup provides an AC signal to the control unit. Minimum voltage output from the pickup during engine cranking should be 1.75 VAC.

Air Gap
(See Figure 3 or Figure 4)

The air gap between the ring gear and pickup should be 0.040 inches.

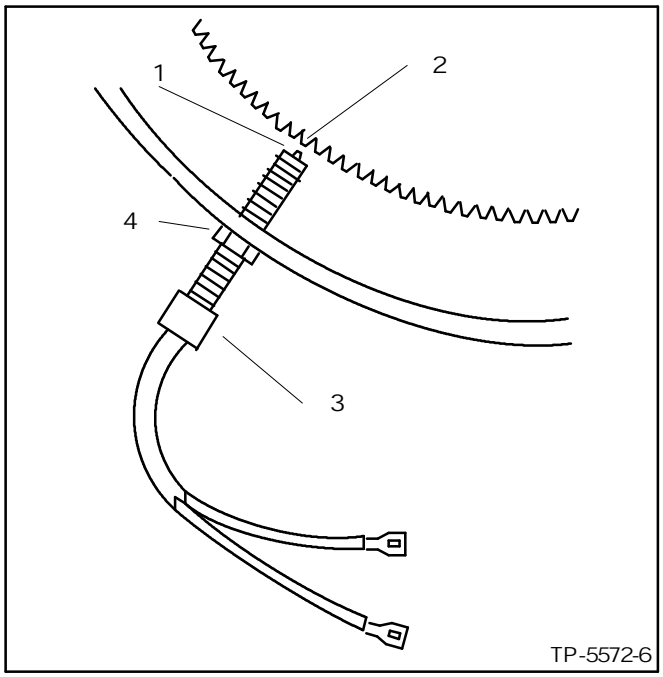
NOTE

Measure the air gap at 3 or 4 places to get an accurate reading.

To adjust air gap, loosen the locknut and turn pickup clockwise until it *just* bottoms on the ring gear, then back out 3/4 turns.

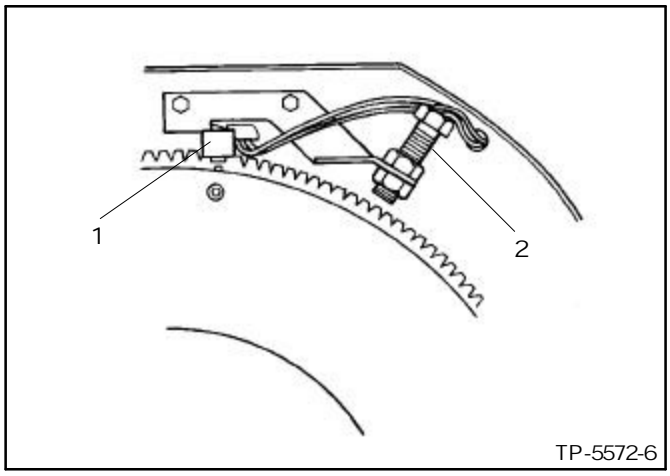
Hold pickup in this position while retightening locknut.

If loss of signal or failure of the pickup occurs while running, the governor control will de-energize the carburetor shut-off solenoid to stop the engine.



1. 0.040-in. air gap
2. Top of flywheel ring gear tooth
3. Magnetic pickup generates an AC voltage
4. Locknut

Figure 3. Magnetic Pickup Air Gap (4/5CKM/CKMR and 6.5RMY)



1. Ignition coil
2. Magnetic pickup

Figure 4. Magnetic Pickup (7CCKM/CCKMR)

Actuator
(See Figure 5 and Figure 6)

The actuator consists of a stepper motor coupled to the carburetor throttle shaft.

It receives signals from the governor control unit and rotates the shaft to the proper position.

To test for proper operation of the actuator, disconnect magnetic pickup leads. Manually move the throttle shaft/governor stepper motor fully counterclockwise (closed throttle). Start generator set. Actuator should initially move clockwise (wide-open throttle) and then turn completely counterclockwise. The actuator should remain in this position. Stop generator set. If actuator fails this test, replace actuator.

The governor actuator should function with steady and smooth movement during operation. If movement of actuator is erratic or large changes in movement occur:

- Check shaft alignment—ensure that the actuator and throttle shafts are concentric and that the throttle-shaft pin is at midpoint of the actuator slot
- Check for excessive coupling slot wear—replace worn parts
- Check for broken or loose wiring including plug connections

Adjust coupling so throttle shaft pin is recessed to the middle of the slot.

Stepper-motor rotational position adjustment is not necessary. Throttle plate position can be either open or closed during assembly.

Only two actuator leads of each coil group are utilized. (BLK-YEL, and RED-WHT.) Resistance per phase: 38.5 ohms.

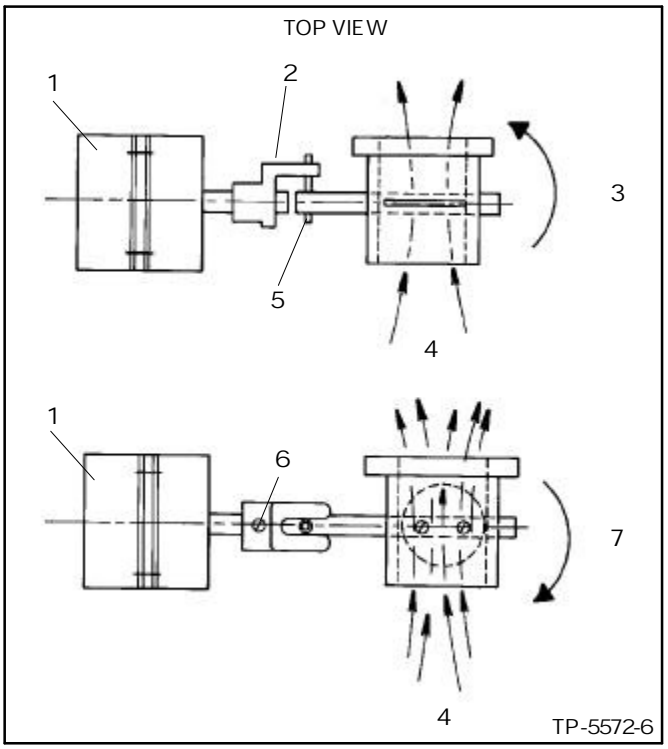
Voltage pulses received from the governor control determine movement of the stepper motor.

NOTE

A 12-VDC voltage applied to the motor leads will result in a single-step movement of 1.8°. Reversal of the voltage polarity will result in a 1.8° movement in the reverse direction.

NOTE

The stepper motor will not continuously rotate with battery voltage supplied to its windings.



1. Actuator
2. Coupling
3. Closed throttle
4. Intake air flow
5. Pin
6. Set screw
7. Open throttle

Figure 5. Actuator (Stepper Motor)

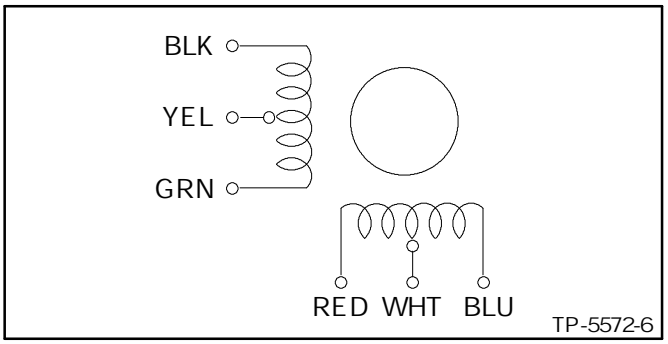


Figure 6. Actuator Coil Group

Governor Control

The electronic control board provides power to the actuator. It also controls energizing and de-energizing of the fuel—anti-diesel (AD) solenoid or gas valve.

Prior to any governor adjustments:

1. Open the line circuit breaker between the generator and any loads which may be frequency sensitive.
2. Connect a frequency meter to the generator AC output in order to monitor AC output while making adjustments.

Speed Adjustment

Turn speed potentiometer clockwise to increase speed, counterclockwise to decrease speed. See Figure 7.

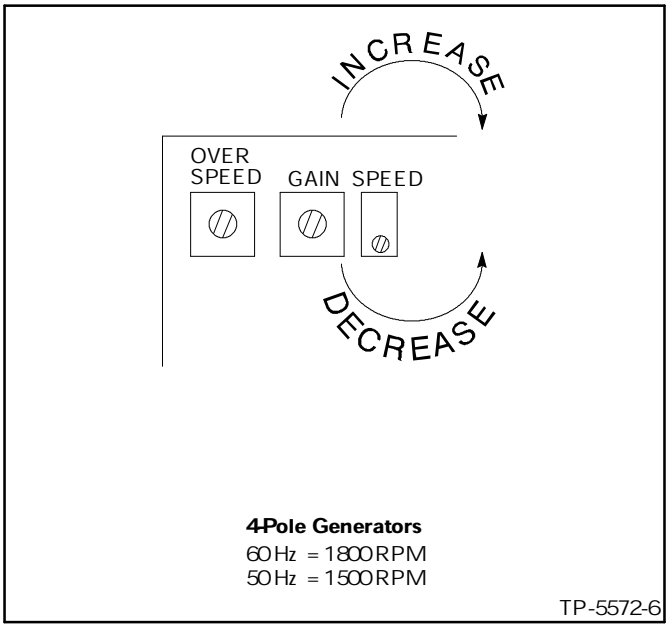


Figure 7. Speed Potentiometer

Gain Adjustment

The Gain Potentiometer (Pot) pertains to governor sensitivity. See Figure 8.

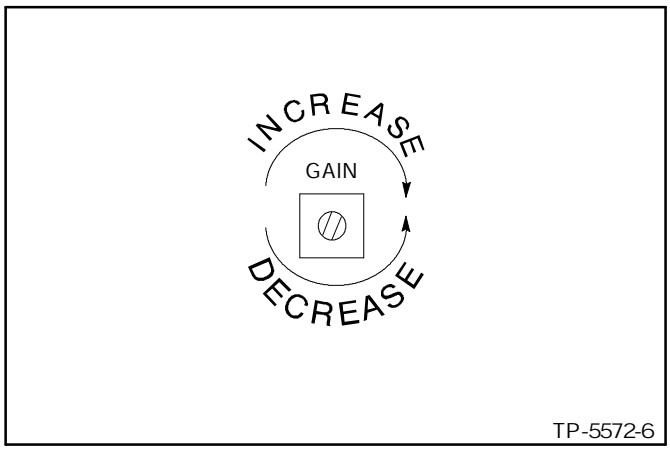


Figure 8. Gain Potentiometer

- Move Gain Pot in 1/8-turn increments if hunting or surging occurs.
- Changing the Gain Pot setting may affect the governor Speed Pot.
- Governor Speed Pot adjustment will not affect the Gain Pot.

Overspeed Adjustment

The governor control contains a circuit which will de-energize the carburetor fuel solenoid (AD) if the generator exceeds the overspeed setting.

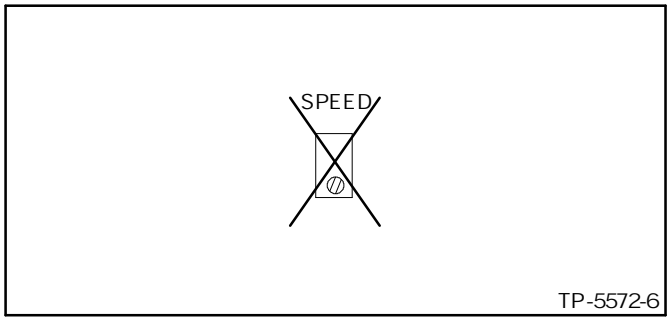


Figure 9. Speed Potentiometer

- Do not use the Speed Pot to check the overspeed shutdown setpoint. See Figure 9.
- Disconnect all loads from the generator when adjusting the overspeed cutout.

1. Connect a frequency meter to the generator output.
2. Turn Overspeed Pot counterclockwise to max. overspeed cut-out point. See Figure 10.

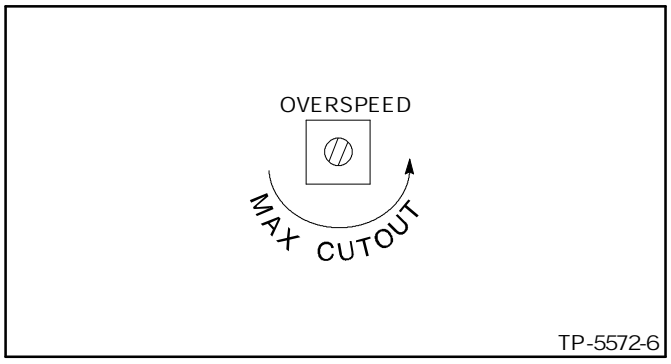


Figure 10. Overspeed Potentiometer

3. While observing the frequency meter, manually turn the governor actuator shaft until frequency reaches the desired cut-out speed.

NOTE

Do not exceed 72 Hertz.

4. While keeping the generator at the desired cut-in speed, slowly turn Overspeed Pot clockwise until unit shuts down. See Figure 11.

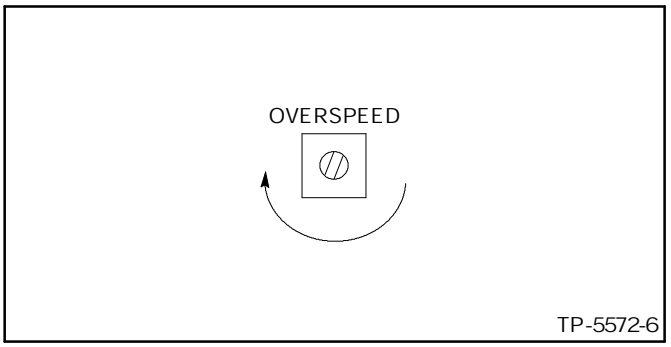


Figure 11. Overspeed Potentiometer

NOTE

If Overspeed Pot is adjusted too low, the engine may shut down on startup because of governor overshoot.

Condition (Fault)	Result
Loss of pickup while running	Throttle moves to closed position and fuel shut-off solenoid de-energizes (genset shutdown)
Engine overspeed	Fuel shut-off solenoid de-energizes (genset shutdown)
Break of fuel shut-off solenoid lead	Fuel shut-off solenoid de-energizes
Loss of DC power to governor assembly	Fuel shut-off solenoid de-energizes (genset shutdown)
Break of stepper motor leads	Erratic performance then fuel shut-off solenoid de-energizes (genset shutdown)
Actuator linkage failure	Erratic performance then fuel shut-off solenoid de-energizes (genset shutdown)

Figure 12 Electronic Governor Fault Shutdown Conditions and Results

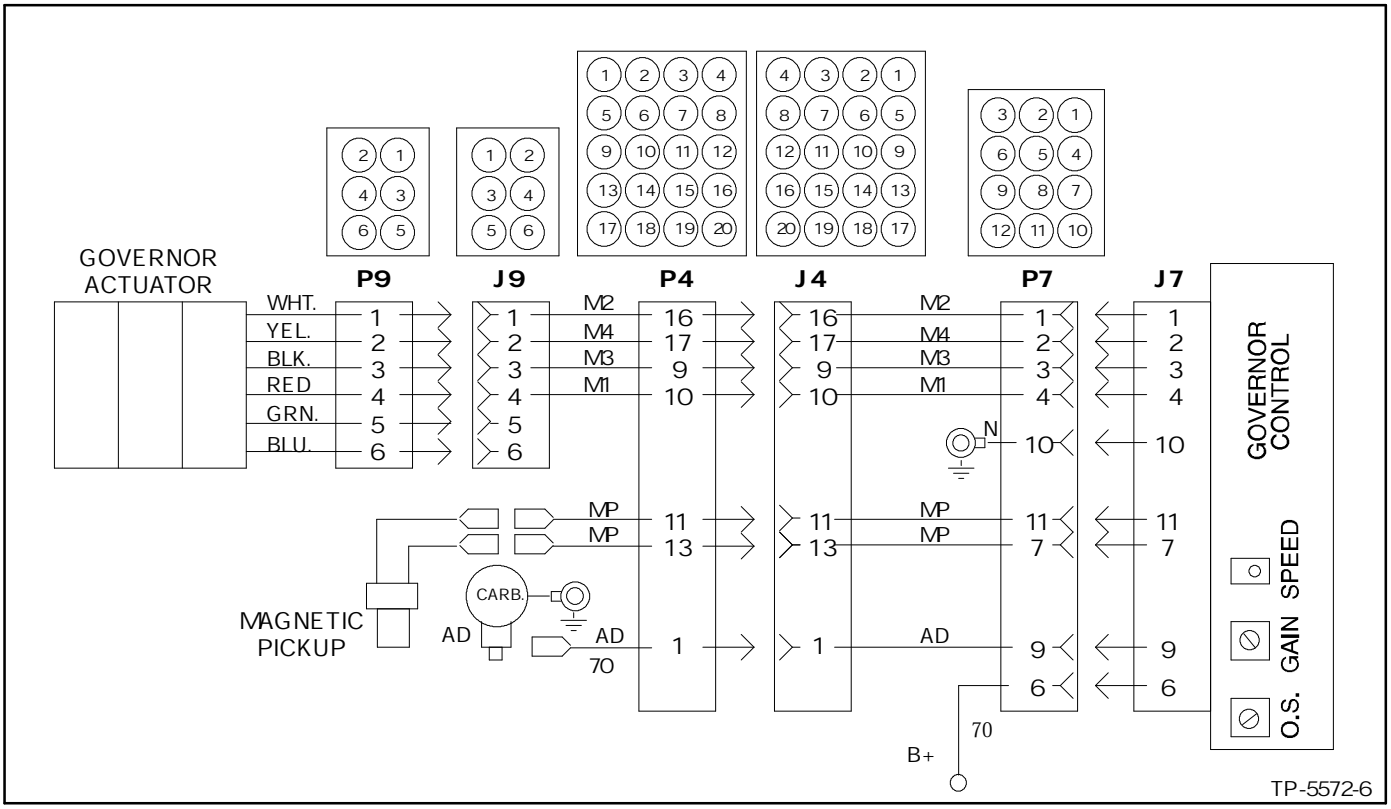


Figure 13 Electronic Governor Schematic (Typical)

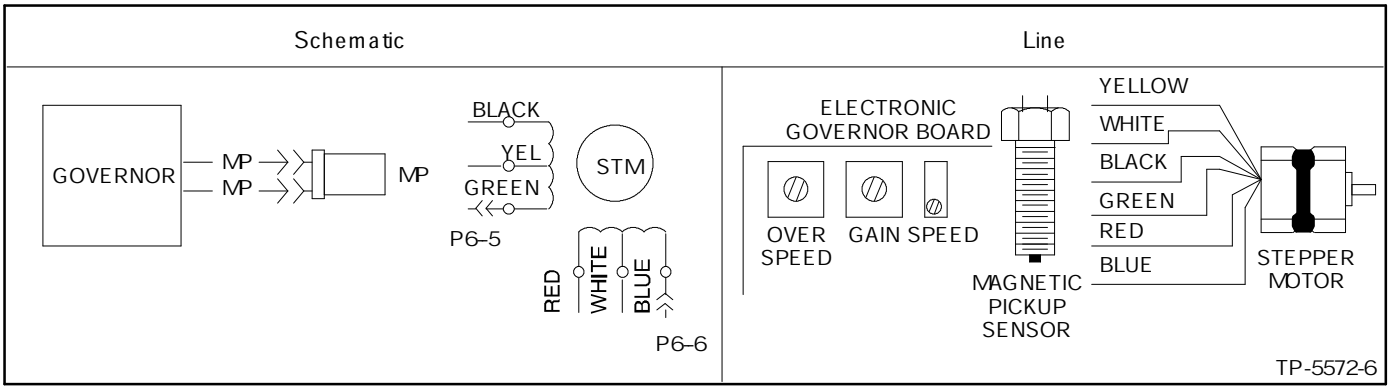


Figure 14 Schematic Symbols (Typical)